Function of play
(ultimate causes)

1. Play aids in the development of cognitive (mind) and motor skills

2. Play promotes kin recognition/ social learning

Logic
Rational thought

Do animals have logic reasoning?

Logic and language

Is language essential for rational thought?

Logic and language

Perhaps other species have the potential for language and logical thought but have never been under the types of selective pressure for language?

Do some species have our capacity for rational thought?

Some other communication systems express the same mental processing in very different ways?

How do we test animal's capacity for logic, reasoning?

1. Teach animals our kind of language system

2. Whether animals categorize, formulate concepts (ethological approach)?

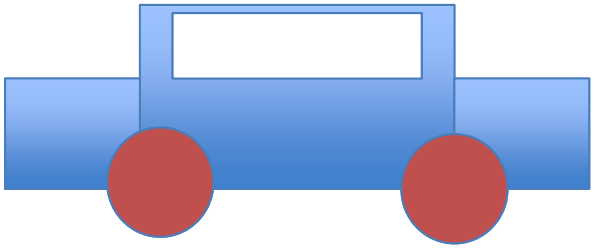
Logic: categorization

A is A

A is not not-A

Everything is either A or not-A

1. Can animals categorize objects?

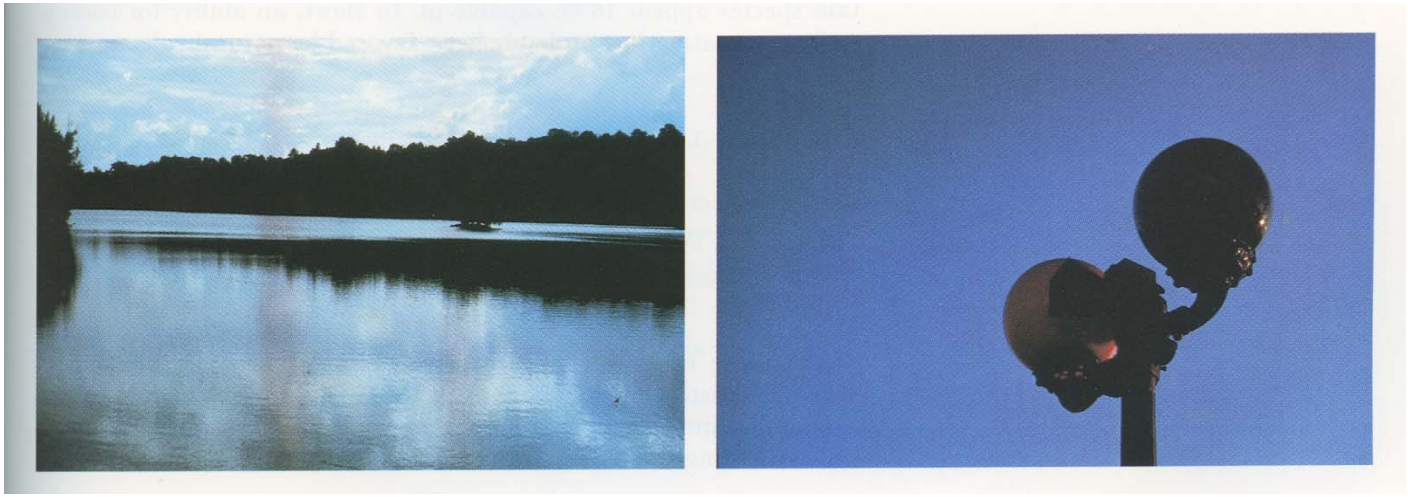


1. Can pigeons categorize and deduce what they have in common?

Visual categorization:

Lab-raised pigeons to slides of various scenes: operant learning

Pigeons: categorize trees?



Pigeons create a rough mental category for trees by visual learning

Or: Innate representation of trees?

Quiz:

Why use pigeons for visual categorization?

Understand the natural behavior of the pigeons?

Logical thought

A is A

A is not not-A

Same – different paradigm

Work well in chimpanzees, but not pigeons

Logical thought

X = Y

Y = Z

Therefore, X=Z

Elated = Happy
Happy = Joyful
Joyful = Elated

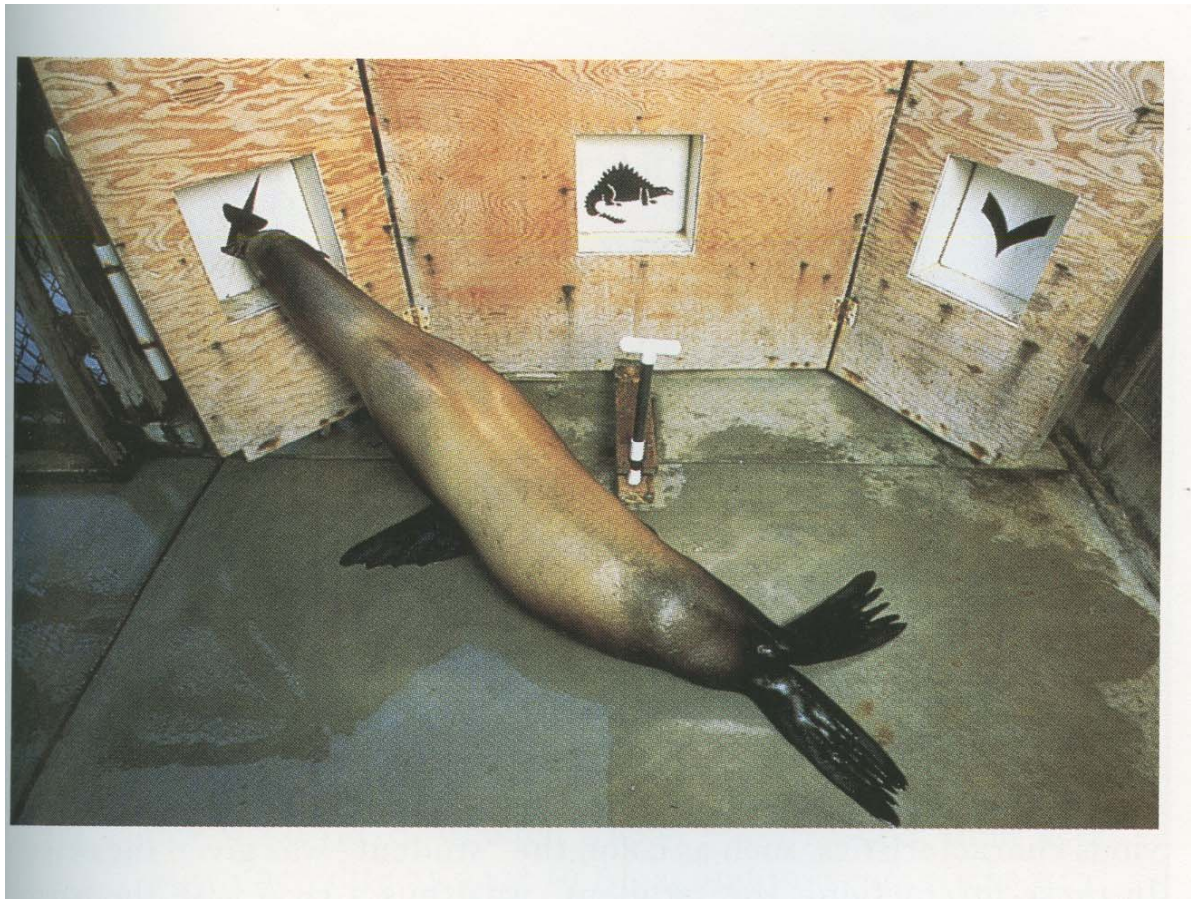
Logical thought

X = Y

Y = Z

Therefore,

X=Z



Sea Lions can do it!

A

B C D

A = B

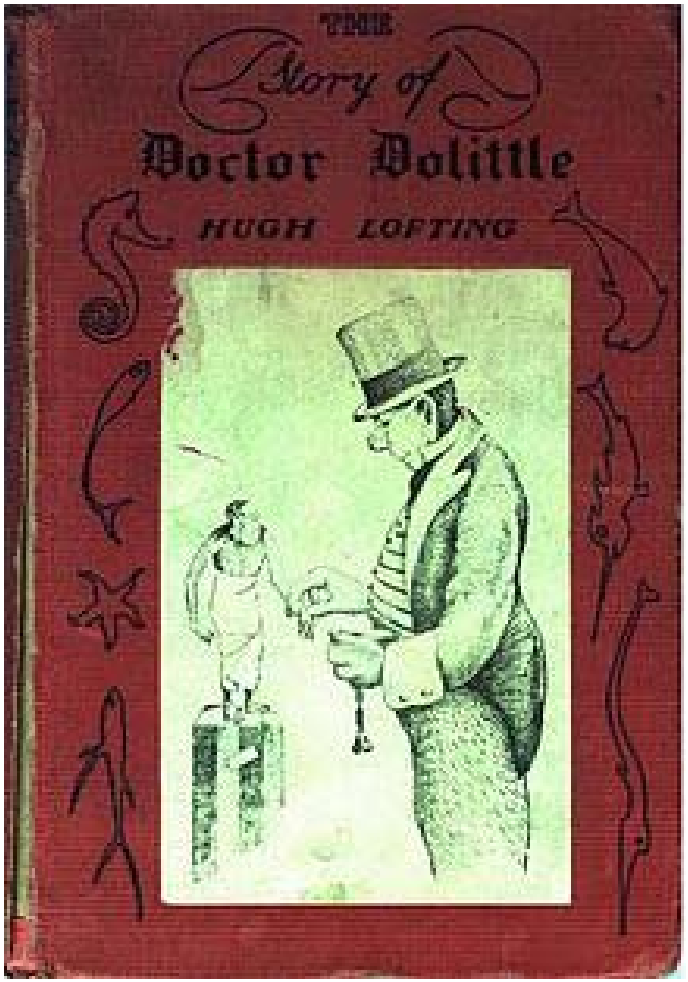
B = Z

A = Z

Perhaps animals have the capacity for logic reasoning, but we did not find a good method to test it.

Spoken language

It will be much easier to study animal mind if we could just talk to them.



What could be a good animal model for vocal communication/learning?

Songbirds!

Parrots!

How to train a parrot to learn the sounds?

1.Isolation in the lab
-- operant conditioning

How to train a parrot to learn the sounds?

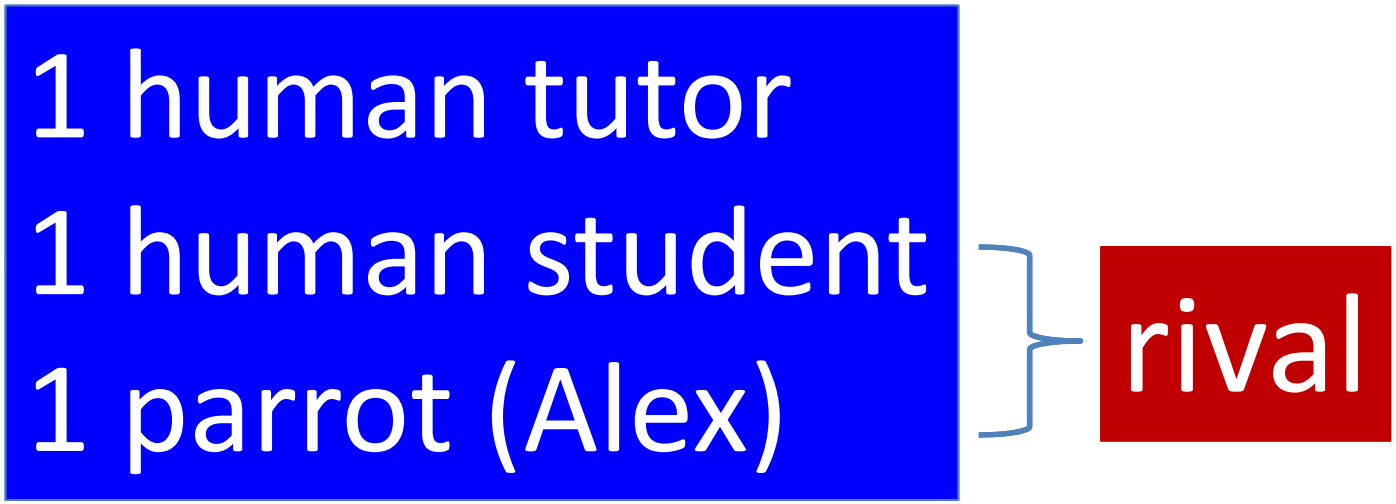
How they learn their vocalizations in nature?

Learn under Social contexts

Alex and Pepperberg

Social interaction is the key

How to train a parrot to learn the human sounds?



Jealousy and attention is the key to motivate the parrot's learning

IRENE (acting as trainer): Bruce, what's this?

BRUCE (acting as model/rival): *Five* wood.

IRENE: That's right, *five* wood. Here you are . . . *five* wood. (hands over five wooden popsicle sticks; Bruce begins to break one apart, much as Alex would)

ALEX: 'ii wood.

BRUCE (now acting as trainer, quickly replaces broken stick and presents the five sticks to Alex): Better . . . (briefly turns away, then repositions himself in visual contact with Alex) . . . How many?

ALEX: No!

BRUCE (turns from Alex to establish visual contact with the principal investigator): Irene, what's this? (presents sticks)

IRENE (now acting as model/rival): 'ii wood.

BRUCE: Better . . . (turns, then resumes eye contact) . . . How many?

IRENE: *Five* wood (takes wooden sticks) . . . *five* wood. (now acts as trainer, directs gaze to Alex, and presents sticks to him) . . . How many wood?

ALEX: Fife wood.

IRENE: OK, Alex, close enough . . . *fivvvve* wood . . . Here's *five* wood. (places one stick in the bird's beak and the other within his reach)

Alex the parrot

200-word vocabulary
- adjective (color, shape)
- substance (paper, plastic)
- number
- phrase

What do we learn from this?

Alex can understand the concept and the logical connections involved

If you could find a right method (training under social interaction)

Language-based training only served to reveal an ability regularly used by parrots in nature

Logic thought does not require language.

1.Spoken language

2. Gesture language

(>200 human gestures)

Gesture language

(one-way signal)

Bottle-nosed dolphins

Problem solving

Mimic

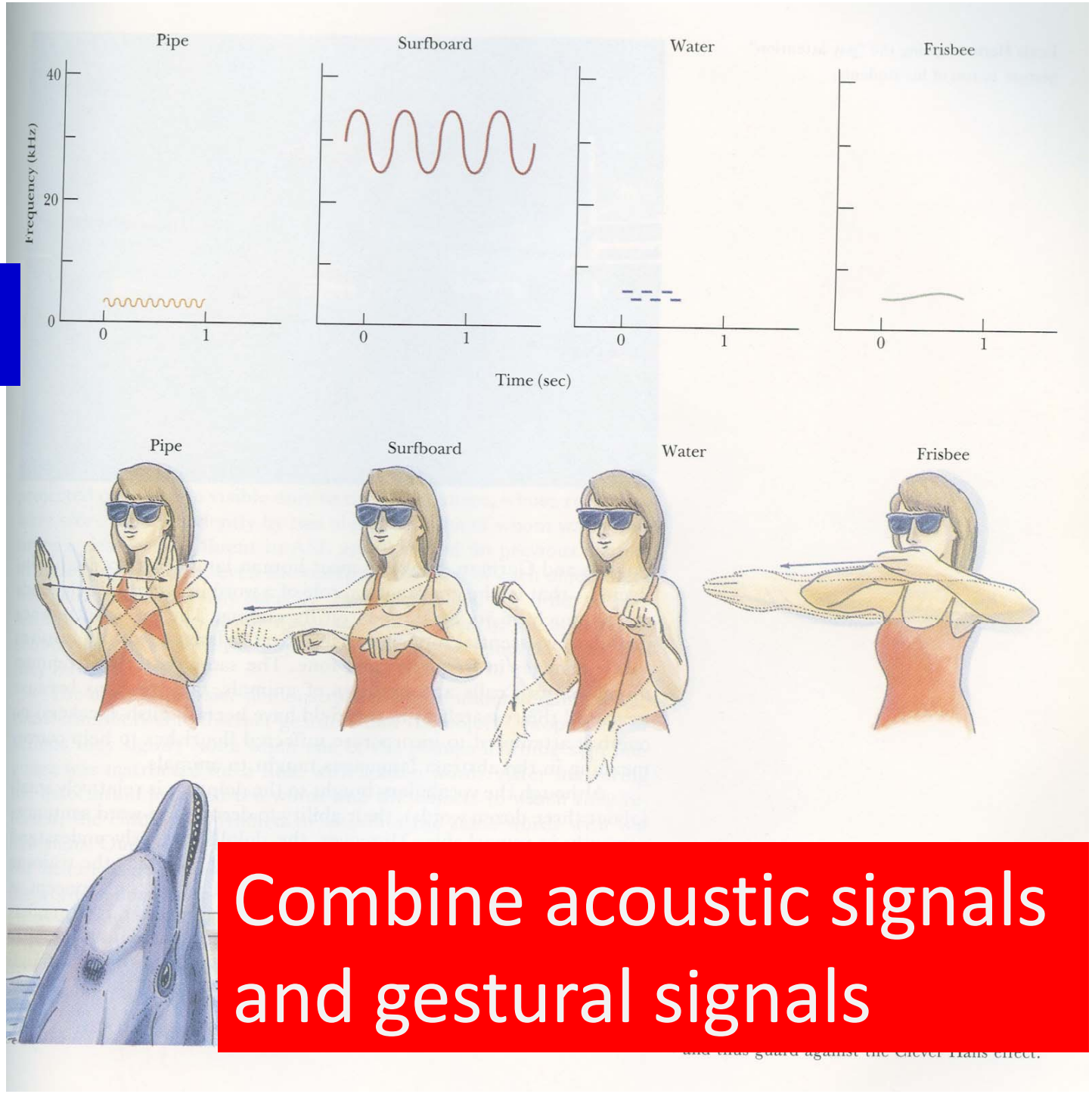
Vocal learning

play

Gesture language

Empathy

Dolphins



Combine acoustic signals and gestural signals

Word-order grammar

Subject-adjective, subject-noun, verb, object-adjective, object-noun

Bottom pipe place in surface hoop

Word-order grammar

Subject-noun, subject-adjective, object-noun, object-adjective, verb

Pipe bottom surface hoop place in

Gestural language in dolphins

1. decode 5-word sentence
2. understand what the words mean

Gestural language in chimpanzees

Washoe: 130 words-4 years
(1965-2007)

Use American sign language

Gestural language in chimpanzees

1. Associate 10 words → 10 objects
2. Associate the same 10 words →10 new signs
3. Present one object to chimp
   → show the signs

Washoe named a swan:

2-sign combination “water bird”

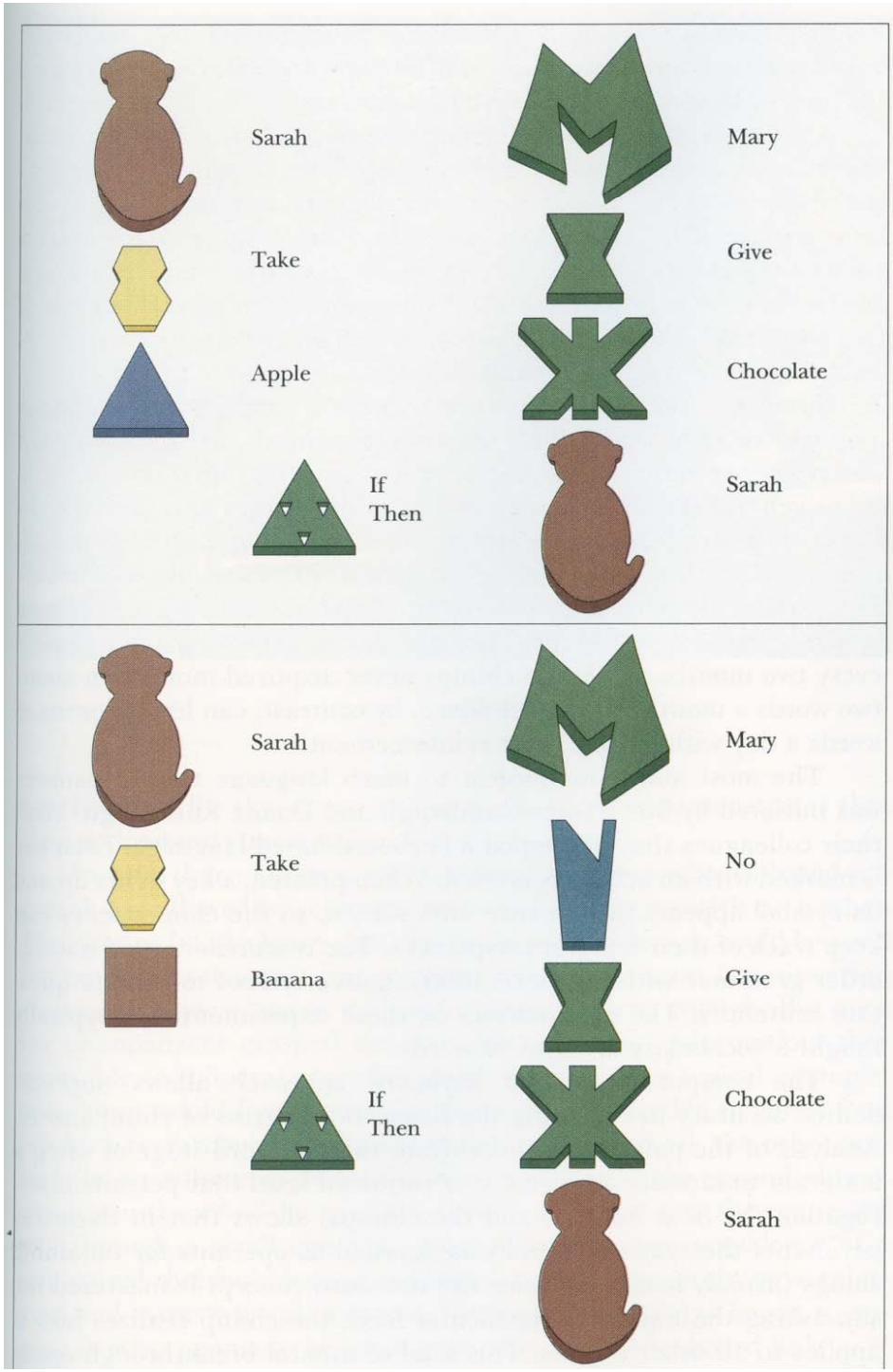
Named watermelon: “candy drink”

Use sign language in chimpanzees

1. Understand concepts
2. Cultural transmission of learned skill
3. No evidence of grammatical organization??

Symbol-based language learning in chimpanzees

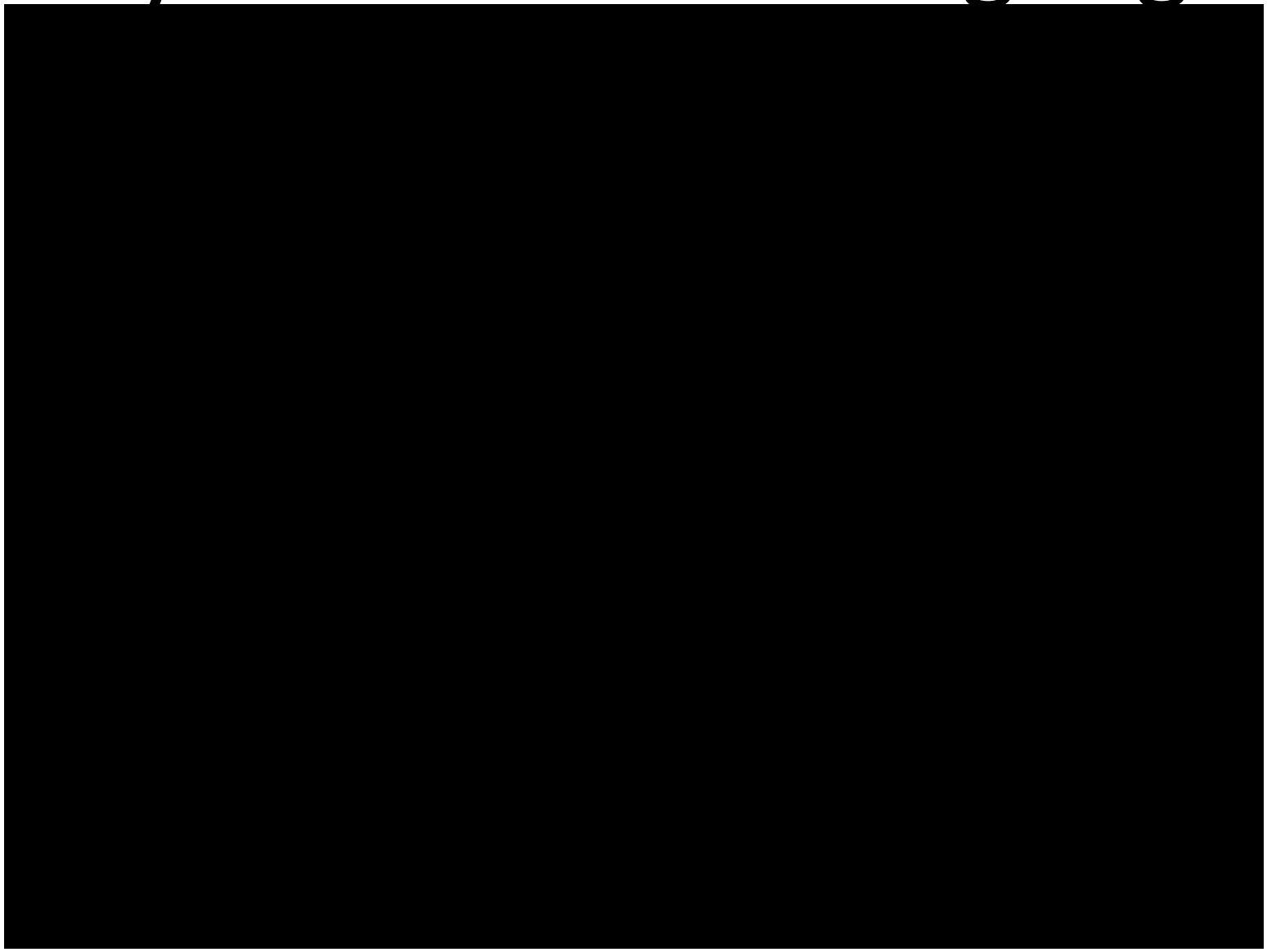
Lexigrams-
use colorful plastic shapes as words



After the chimpanzee Sarah was taught to use a language based on plastic shapes, she learned to interpret conditional sentences. The first sentence reads, "If Sarah takes the apple, then Mary will give chocolate to Sarah"; the other, more sinister, outlines a different consequence: "If Sarah takes the banana, Mary will not give chocolate to Sarah."

Sarah

Keyboard-based language

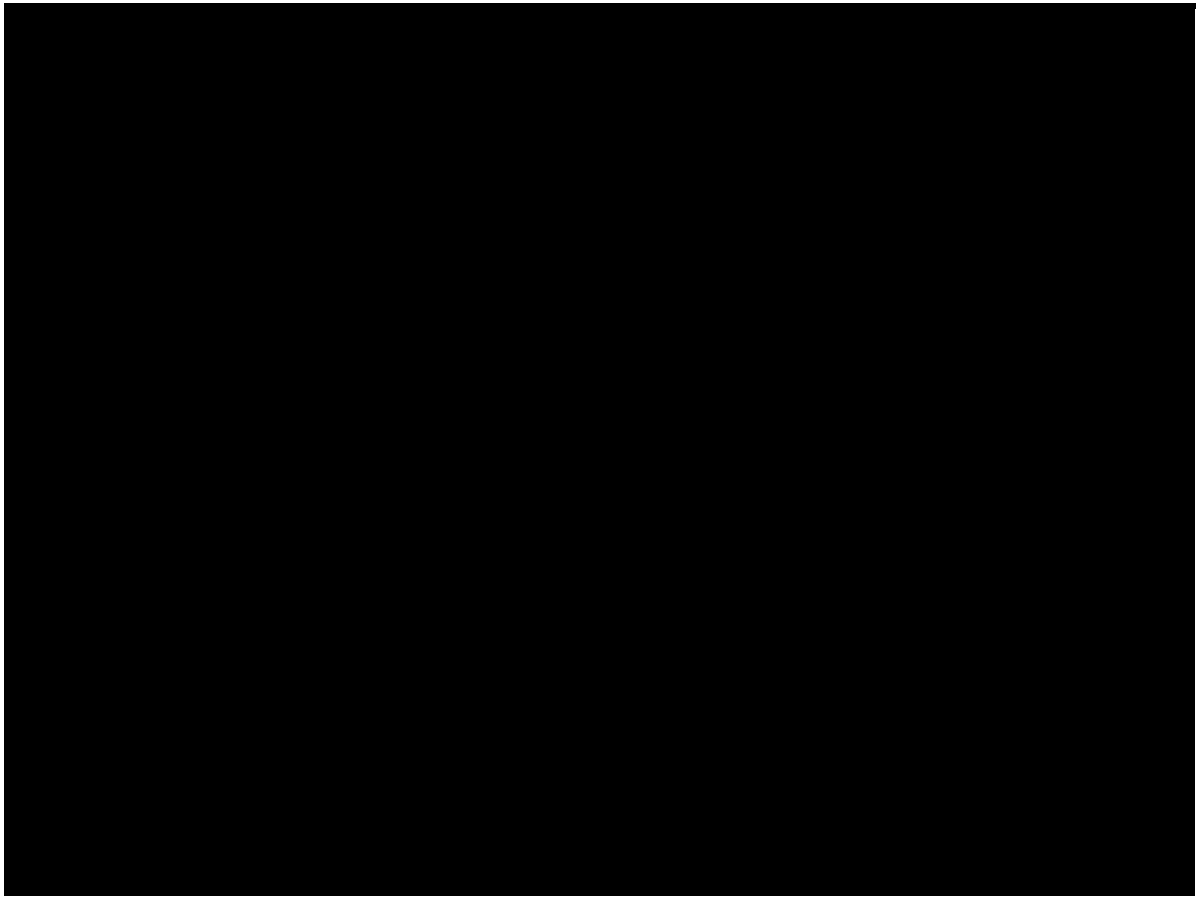


Kanzi

Keyboard-based language

Allow two chimps to communicate with each other

Kanzi



Understand the symbols and their use as tools for exchanging information and communication of intentions.

No other species use our sort of language

Is language essential for rational thought? No